

Feedstock Technologies Program Day 2 Introduction

April 4, 2023

Dana Mitchell

Technology Manager, BETO

FT session themes at a glance

Monday 4/3/23

Plenary

Tuesday 4/4/23

Sustainable
Agriculture

Wednesday 4/5/23

Co-Product
Development

Preprocessing

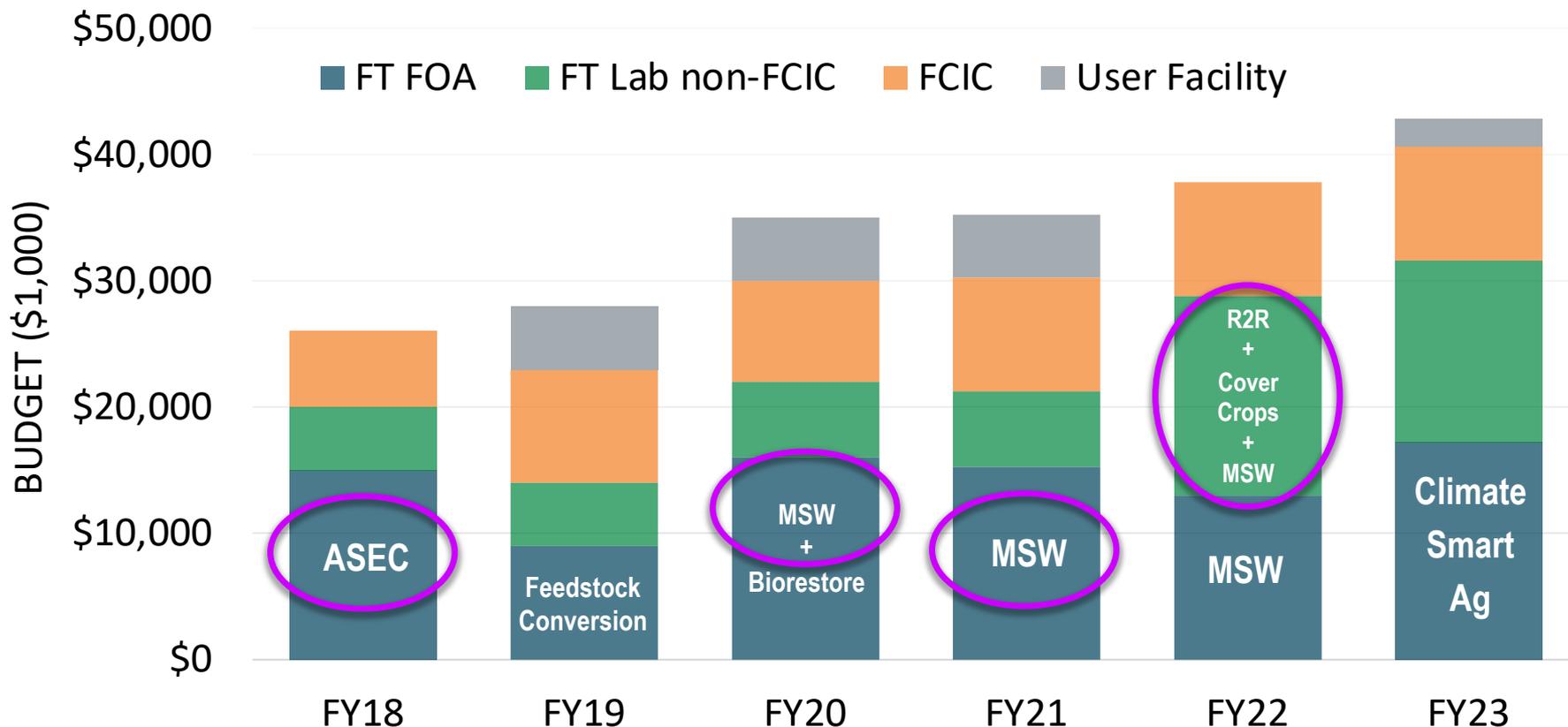
Lunch!

Feedstock
Supply Chain
Analysis

Municipal
Solid Waste

Conversion
Interface

FT RD&D Day 2 Projects



5 FT Lab projects to be reviewed today, FY22

8 FT FOA projects to be reviewed today, FY18, FY20, FY21

Today's Morning Agenda

FEEDSTOCK TECHNOLOGIES

DAY 2 – TUESDAY APRIL 4, 2023

Start Time (MT)	End Time (MT)	Title	Organization	Speaker
8:30 AM	8:45 AM	Technology Area Daily Intro	BETO	Dana Mitchell
8:45 AM	9:15 AM	Roads to Removal	LLNL	Roger Aines
9:15 AM	9:45 AM	Next-Generation Feedstocks for the Emerging Bioeconomy	University of Illinois at Urbana-Champaign	DK Lee
9:45 AM	10:15 AM	Sustainable Herbaceous Energy Crop Production in the Southeast United States	Texas A&M AgriLife Research	Ted Wilson
10:15 AM	10:30 AM	<i>Break</i>	<i>All</i>	
10:30 AM	11:00 AM	Cover crop valorization for biofuels and products	INL	Bill Smith
11:00 AM	11:30 AM	Maximizing the value of late year cover crops in the Pacific Northwest	PNNL	Daniel Santosa
11:30 AM	12:00 PM	National availability and costs of cover crops managed as biofuel feedstocks	ORNL	Esther Parish
12:00 PM	1:00 PM	<i>Lunch</i>	<i>All</i>	

Today's Afternoon Agenda

1:00 PM	1:30 PM	Municipal Solid Waste Preprocessing and Decontamination	INL	Vicki Thompson
1:30 PM	2:00 PM	Artificial Neural Network for MSW Characterization	AMP Robotics	Carson Potter
2:00 PM	2:30 PM	Decontamination of Non-recyclable MSW and Preprocessing for Conversion to Jet Fuel	GTI	Tim Saunders
2:30 PM	3:00 PM	Advanced Sensing for Characterization and Sorting of Non-Recyclable Plastics Using Sensor Fusion with Artificial Intelligence	UHV Technologies	Nalin Kumar
3:00 PM	3:20 PM	Break	All	
3:20 PM	3:50 PM	High Precision Sorting, Fractionation, and Formulation of Municipal Solid Waste for Biochemical Conversion	University of Cincinnati	Maobing Tu
3:50 PM	4:20 PM	AI-Enabled Hyperspectral Imaging Augmented with Multi-Sensory Information for Rapid/Real-time Analysis of Non-Recyclable Heterogenous MSW for Conversion to Energy	North Carolina State University	Lokendra Pal
4:20 PM	4:50 PM	Integrated LIBS-RAMAN-AI System for Real-Time, In-Situ Chemical Analysis of MSW Streams	Lehigh University	Zheng Yao
4:50 PM	5:30 PM	Closed Door Comment Review Session	Reviewers	

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**Sustainable
Agriculture**

Lunch!

Affordable and Sustainable Energy Crops (ASEC) FOA

FOA Objective - To accelerate research and development related to the production of affordable and sustainable non-food energy crops that can be used as feedstocks for the production of price-competitive biofuels and bioproducts

FOA Metrics - Advance the state of technology for energy crops that can be used as biofuels or bioproducts

- Show how work supports BETO's goal of \$3/GGE
- Reduce cost of feedstock delivered to conversion reactor to <\$84/dry ton
- Deliver TEA that includes planting, harvesting, collecting, and on-farm storage

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
\$2.5 - \$5M	\$15M	5 years	20%



FY21 Feedstock Technologies Cover Crop Lab Call

- **R&D Area 1b Specific Areas of Interest**

- Decarbonization of Agriculture

- Reduction of carbon intensity of energy crops and cover crops
- Impact of the timing of cover crop planting and maturity on commodity crops

- Valorization of Cover Crops beyond Soil Health

- Ecosystem service benefits provided by cover crops to demonstrate value in areas other than soil carbon sequestration
- Estimates of biomass potential of cover crops to identify potential markets

Total Federal Funding	Award Duration	Number of Projects Selected
\$3.65M	3 years	3-4

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Lunch!

**Municipal
Solid Waste**

MSW FOAs and support AOP

Current BETO MSW Feedstock R&D includes:

- MSW stream fractionation, characterization of variability, sorting, decontamination, preprocessing, and formatting to improve MSW quality and produce conversion-ready feedstocks for downstream conversion into SAF
- Development of value-added co-products to increase the feedstock value and support the production of sustainable fuels
- Sustainability (Environment, Economic, Social) analysis in Waste-to-Energy supply chains
- BETO/AMO has joint R&D activities on Plastics Chemical Upcycling and Design within BOTTLE



FY20 BETO Multi-Topic FOA: Subtopic Area 2A

Subtopic 2A – Advanced Fractionation and Decontamination of MSW

- To develop advanced and economically viable sorting and preprocessing methods to address MSW heterogeneity and variability, and to produce high-purity value-added feedstocks

FOA Metrics

- Increase purity of waste stream by 95% and reduce variability of feedstock by 50% relative to proposed baseline via fractionation
- Reduce contamination in high fidelity fraction by 80%
- Show added cost of technology does not exceed \$30/ton over a Delivered Cost Goal of \$86/ton

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
\$1 - \$2.5M	\$9M	3 years	20%



FY21 BETO Feedstock Technologies and Algae FOA

Subtopic 1A: Measurement of variability of key MSW characteristics within and across unique MSW streams

- Focuses on understanding the variability of MSW characteristics that are critical to specific conversion technologies, to inform the steps necessary to produce conversion-ready feedstocks.
- Metric: Project specific variability of each key characteristic in MSW stream

Subtopic 1B: Development of novel methods for rapid/real-time measurements

- Focuses on developing rapid/real-time measurement techniques for critical characteristics.
- Metric: Improvement in throughput of characterization technology of 25%

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
\$2 - \$3.5M	\$15M	2-4 years	20%



FY22 BETO Waste Feedstocks and Conversion R&D FOA

Topic Area 1: MSW Feedstock Technologies

Subtopic 1A: Advanced MSW Preprocessing for Conversion-ready Feedstocks

- Reduce MSW variability, remove contamination, and improve quality for efficient downstream conversion into SAF
- Metric: Project specific MSW quality improvement of three characteristics

Subtopic 1B: High Value Co-product Development from MSW

- Produce valuable non-fuel coproducts from low quality MSW fractions at bench scale to improve the economic viability of SAF pathways
- Metric: Significantly increase the total value of MSW streams through TEA

Federal \$\$ Per Award	Total Federal Funding	Award Duration	Cost Share (%)
\$1.25 – 2.25M	\$13M	2-3 years	20%



FY23 FT Peer Reviewers

- **Dr. Jingxin Wang, West Virginia University (Lead Reviewer)**
- **Dr. Shakira Hobbs, Assistant Professor, University of California, Irvine**
- **Dr. Sally Krigstin, Assistant Professor, University of Toronto**
- **Dr. Bhima Vijayendran, Managing Partner, Redwood Innovation Partners, LLC**
- **Dr. Kevin Kephart, Deputy Director, Institute of Bioenergy, Climate, and Environment, NIFA, USDA**



Questions?